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ABSTRACT

Phase II of a two-part study identified the inservice needs of 63 entry-level agriculture teachers in Texas by comparing rankings of inservice needs as determined by direct assessment in phase I and as determined by a mean weighted discrepancy score. In phase II, teachers rated the level of importance of 163 competencies. A discrepancy score was calculated for each teacher on each competency by subtracting the ability rating from phase I from the importance rating; a weighted discrepancy score was calculated for each teacher on each competency by multiplying the discrepancy score by the mean importance rating for the competency; and a mean weighted discrepancy score for each competency was determined by dividing the sum of the weighted discrepancy scores by the number of observations for that competency. Competencies were ranked by mean weighted discrepancy scores. Four competencies ranked among the top 15 on the mean weighted discrepancy score and expressed needs mean: assisting students in preparing for and succeeding in Future Farmers of America programs; using the Internet as a teaching tool; implementing Tech Prep and school-to-work initiatives; and integrating computer-assisted design into agricultural mechanics. When ordered based on mean weighted discrepancy score, the 20 highest-ranking competencies represented 9 of 14 competency areas; 15 of these 20 came from 4 areas related to facilitating the following: (1) change in curriculum and technologies, (2) balance in personal and professional roles, (3) positive public image, and (4) student leadership and personal growth. (Contains 26 references) (YLB)

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ED 431 869

Assessing the Inservice Needs of Entry-Phase Agriculture Teachers in Texas: A Discrepancy Model versus Direct Assessment

Introduction/Theoretical Framework

There is a general consensus among all educators that resources are precious. Witkin (1984, p. x) stated, "Effective needs assessment provides the basis for decisions on priorities either for program development or retrenchment." Any difference between "desired status of learners" and "current status of learners equals an educational need" (Popham, 1993, p. 67). Identifiable areas of need may be used as decision rules for determining future resource allocation. Therefore, the method by which needs are identified and prioritized for delivery must be valid.

Historically, one of the main functions of collegiate agricultural education departments has been the identification of relevant topics to provide agriculture teachers during inservice training (Barrick, Ladewig, & Hedges, 1983). Researchers (Garton & Chung, 1995; Mundt & Connors, 1997) have noted the relationship between problems entry-phase agriculture teachers encounter and opportunities the problems create for providing inservice. According to Birkenholz and Harbstreit (1987, p. 48), inservice providers should "periodically monitor the needs of beginning teachers as they change over time and provide assistance based upon current needs." Further, Garton and Chung (1995, p. 78) stated that "research is needed to assess the inservice needs of today's beginning agriculture teachers."

Many researchers have used direct assessment models for determining inservice needs of entry-phase agriculture teachers (Birkenholz & Harbstreit, 1987; Briers & Edwards,1998; Claycomb & Petty, 1983; Farrington, 1981; Miller & Scheid, 1984; Shippy, 1981; Webb, Stoner, & Vaclavik, 1977). Others have used the Borich model (Barrick & Doerfert, 1989; Barrick & Powell, 1986; Garton & Chung, 1995; McDonald & Lawver, 1997; McGregor & Lawver, 1997; Newman & Johnson, 1994). The Borich model is based on a discrepancy score derived from respondent-determined level of importance and level of performance for the specific competency being assessed (Borich, 1980).

Borich (1980) concluded the model "... is sufficiently direct that data analysis and instrument construction are no more complex than with any type of follow-up survey; yet it yields more data, and more understandable data, than many other types of follow-up questionnaires" (p. 42). Barrick et al. (1983) stated that to select inservice topics based on one ranking "would be less reliable than selecting topics based upon a combination of rankings" (p. 16), i.e., the Borich model. Further, Barrick et al. (1983, p. 15) "hypothesized that there would be a significant difference among the rankings of the topics [for inservice] by importance scores, knowledge scores, and application scores." In 1983, Barrick et al. tested the Borich model and found the use of only one ranking, whether it is importance, knowledge, or application, "may not be valid" (p. 19), and that "a combination of two or more rankings must be considered to form conclusions regarding inservice education needs" (p. 19).

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Barrick et al. (1983) concluded, "The [Borich] model provided defensible data in identifying important topics in which teachers need further knowledge" (p. 19). Other researchers have supported Barrick's conclusions (Newman & Johnson, 1994). Waters and Haskell (1989) stated the Borich needs assessment model "... appears to have merit for adding validity to the process of assessing respondents' perceptions about the importance of educational program needs ..." (p. 26).

Inservice education for entry-level teachers in Texas was a driving force for this study. However, the specific questions answered in the study were as follows: Will the ranking of competencies be different depending on whether they were ranked based on mean rating scores (expressed need) or were ranked by mean weighted discrepancy score? Which one of these rankings will be more valid?

Purpose and Research Questions

This study represents Phase II of a two-part investigation whose purpose was to identify inservice needs of entry-phase agriculture teachers in Texas. The purpose of Phase II was to compare the ranking of inservice needs as determined by direct assessment in Phase I (Briers & Edwards, 1998) to a ranking of those needs based on a mean weighted discrepancy score. These research questions guided this phase: (1) What are the rankings for inservice education of these competencies based on mean weighted discrepancy scores? (2) How do mean weighted discrepancy score rankings compare to Phase I rankings for in-service education based on a direct assessment approach (expressed needs for inservice)?

Methods/Procedures

In 1997, the Department of Agricultural Education at Texas A&M University, in cooperation with the Texas Education Agency (TEA), conducted Phase I of a descriptive study to assess inservice needs of entry-phase agriculture teachers in Texas. Phase II of the study was conducted in the spring of 1998. The target population for Phase I consisted of entry-phase teachers. "Entry-phase" was defined as teachers who began teaching during the school year 1994-95, 1995-96, or 1996-97. Those surveyed consisted of "additions" to the *Directory: Texas Teachers of Agricultural Science and Technology* for academic years 1994-95, 1995-96, and 1996-97. In Phase I, one hundred sixty-five teachers were identified as "entry-phase" teachers. Ninety-one (55%) of these teachers responded. These respondents were the target data source for Phase II. Between Phases I and II, the group experienced a mortality of fifteen teachers (i.e., no longer teaching agriculture). The final sample frame for Phase II was seventy-six entry-phase teachers.

A list of competencies needed by agriculture teachers was developed based on a review of literature (Barrick & Powell, 1986; Birkenholz & Harbstreit, 1987; Claycomb & Petty, 1983; Farrington, 1981; Garton & Chung, 1995; Miller & Scheid, 1984; Norton, 1995; Shippy, 1981; Webb et al., 1977). Content validity of the instrument was established by

agricultural educators in Texas, including members of the Texas A&M University Department of Agricultural Education and members of the Texas Education Agency state staff for Agricultural Science and Technology. The conceptual framework for competencies originated from DACUM (Norton, 1995). The final list consisted of 163 different competencies, divided into 14 competency "areas." Three areas were determined to be "core competency areas": "Facilitating Student Learning in Classroom and Laboratory Settings" (22 competencies), "Facilitating Student Leadership and Personal Growth" (16 competencies), and "Facilitating Student Agricultural Experiences" (13 competencies) (Edwards, Briers, Shinn, & Herring, 1998).

To shorten the instrument, the remaining competencies were grouped as follows: "Student Services Competencies" (32 items); "Program Management Competencies" (24 items); "Personal Roles & Relationship Competencies" (33 items); "Planning & Managing Educational Tools & Technologies" (23 items). In Phase I, members of the population were randomly assigned to one of four groups, with each group receiving a different instrument. These same groups were used for Phase II. A matrix sampling technique asked each subject to respond to the 51 core competencies and to approximately one-fourth of the remaining items (23 to 33 competencies).

In Phase I, teachers were asked to "grade" their level of performance (ability) for the selected competencies. (This rating of their ability to perform selected tasks, that is, their competence, was used in Phase II in calculating discrepancy score.) Next, teachers were asked to rate directly their need for inservice training (expressed need), with "5" meaning "highest need," "4" representing "much need," "3" was "some need," "2" being "little need," and "1" meant "no need." Finally, subjects responded to items describing themselves and their schools (Birkenholz & Harbstreit, 1987). In Phase I, the 163 competencies were ranked based on the teachers' expressed need for inservice education. See Briers and Edwards (1998) for specific results/findings of Phase I.

In Phase II, teachers were asked to "rate" the level of importance for the selected competencies: "5" was "high importance," "4" was "much importance," "3" was "some importance," "2" was "low importance," and "1" meant "no importance." Obtaining an importance rating allowed for calculation of a *mean weighted discrepancy score* for each competency. First, a *discrepancy score* for each teacher on each competency was calculated by subtracting the grade (ability) rating from the importance rating. A *weighted discrepancy score* was then calculated for each teacher on each competency by multiplying the *discrepancy score* by the mean importance rating for that competency. A *mean weighted discrepancy score* for each competency was then calculated by dividing the sum of the *weighted discrepancy scores* by the number of observations for that competency. Finally, the 163 competencies were ranked using the *mean weighted discrepancy score (MWDS)* (Barrick et al., 1983; Borich, 1980; Garton & Chung, 1995; Newman & Johnson, 1994).

Because there were 163 competencies and 63 respondents, and because each teacher responded to only a subset of all competencies, the researchers did not attempt to do any data reduction; factor analysis, for example, was inappropriate. One limitation of this

study, then, is that there are no measures of reliability (internal consistency within the competency areas) of the participants' responses. However, even though the researchers did not examine internal consistency statistically, conceptually the competencies were grouped into competency areas (Norton, 1995).

The first mailing of Phase II, in January, 1998, included an instrument, a cover letter explaining the purpose of the survey, and a return envelope coded to determine non-respondents. In February, 1998, a reminder postcard was sent to non-respondents (Borg & Gall, 1989). Following the reminder postcard, a second instrument, a slightly altered cover letter, and a second return envelope were mailed to non-respondents (Borg & Gall, 1989). Finally, an attempt was made to contact non-respondents via telephone. Some contacted by phone requested a third questionnaire; one was mailed to each who requested one. Three mailings, a reminder postcard, and telephone follow-up of non-respondents yielded a return rate of 83% (63 of 76).

Results/Findings

Of the 163 competencies, four ranked among the top fifteen on both the mean weighted discrepancy score and expressed needs mean (Table 1). They were: "Assisting students in preparing for and succeeding in FFA degree and award programs" MWDS Rank=1, Expressed Needs Rank=15; "Using Internet as a teaching tool" MWDS Rank=2, Expressed Needs Rank=1; "Implementing Tech-Prep and other S-T-W initiatives into the program" MWDS Rank=6, Expressed Needs Rank=13; "Integrating CAD into ag mech" MWDS Rank=8, Expressed Needs Rank=2. These findings agree with Garton and Chung (1995).

When ordered based on mean weighted discrepancy score, the 20 highest-ranking competencies represented nine of the 14 different competency areas. Fifteen of these 20 competencies came from four areas. "Facilitating Change in Curriculum and Technologies" produced rankings 2, 6, 8, and 18 (Table 1). "Facilitating Balance in Personal and Professional Roles" provided rankings 3, 9, 11, and 13 (Table 1). The area "Facilitating Positive Public Image" yielded rankings 4, 5, 12, and 14 (Table 1). The competencies ranked 1, 10, and 15 came from the area "Facilitating Student Leadership and Personal Growth" (Table 1). Other high ranking competencies were "Actively read professional literature and participate in educational events," MWDS Rank=7; "Teaching how to keep good record books," MWDS Rank=16; "Helping gather information about agricultural scholarships," MWDS=17; "Motivating student learning and improving achievement," MWDS Rank=19; and "Control loss of tools, equipment, supplies, and materials," MWDS Rank=20 (Table 1).

Inservice needs relative to "Facilitating Change in Curriculum and Technologies," e.g., computer assisted instruction, have been identified by other researchers (Birkenholz & Harbstreit, 1987; Garton & Chung, 1995; Newman & Johnson, 1994). Interestingly, in Phase I of this study, Briers and Edwards (1998) found teachers' expressed need for inservice for competencies related to human relations to be low, which was in contrast to

Table 1. Rankings of Inservice Needs of Entry-Phase Agriculture Teachers, MWDS[a] versus Expressed Needs (N=63)

MWDS Ranking	Competency	Expressed Needs Ranking
1	Assisting students in preparing for and succeeding in FFA degree and award programs	15
2	Using Internet as a teaching tool	1
3	Balancing quality time among different life roles such as teacher, spouse or parent	110
4	Using support groups to publicize the program	54
5	Involving students in conducting public relations activities	76
6	Implementing Tech-Prep and other S-T-W initiatives into the program	13
7	Actively read professional literature and participate in educational events	108
8	Integrating CAD into ag mech	2
9	Identifying priorities and managing time efficiently	129
10	Assisting students in preparing for and succeeding in FFA CDE's	40
11	Managing and reducing work-related stress	52
12	Planning and conducting student and supporter award and recognition events	100
13	Learning how to say no when appropriate, professional, and the right thing to do	141
14	Communicating the message of the program within the school system	95
15	Aiding students in preparing for and succeeding in LDE's	29

Table 1. Continued

MWDS Ranking	Competency	Expressed Needs Ranking
16	Teaching how to keep good record books	50
17	Helping gather information about agricultural scholarships	60
18	Using computers as a teaching and learning tool	27
19	Motivating student learning and improving achievement	98
20	Control loss of tools, equipment, supplies, and materials	56
	. . .	
95	Securing resources to conduct adult and continuing education programs	9
	. . .	
101	Collaborating with other community adult education programs such as TAEX	7
	. . .	
106	Managing an adult education program	4
	. . .	
108	Using distance education methods to deliver adult education in the community	5
	. . .	
112	Planning lab facilities for integrated courses such as physics with ag mech	3
	. . .	

Table 1. Continued

MWDS Ranking	Competency	Expressed Needs Ranking
116	Planning and designing facilities to accommodate distance education tools, e.g., satellite, video or modem delivery	6
	. . .	
134	Acquiring knowledge and skills for new equipment such as CAD software or DNA mapping	10
	. . .	
154	Planning materials and methods for new scheduling patterns such as block periods	8
155	Earning an advanced graduate degree	132
156	Using seating charts and rotational plans for special groupings	144
157	Carrying out teaching/duty assignments outside-of-my-field	116
158	Maintaining progress charts that demonstrate progress and achievement	114
159	Demonstrating teaching behaviors that are measured by the school district appraisal system	139
160	Actively participate in school and district inservice and teacher organizations	146
161	Preparing for local school district teacher appraisal(s)	134
162	Provide remedial instruction	119
163	Developing and maintaining mentor-protégé relationships	126

[a]Mean Weighted Discrepancy Score

earlier research (Claycomb & Petty, 1983). Yet, it appears that when "level of importance" becomes part of the equation, teachers do desire inservice in this area, i.e., "Facilitating Balance in Personal and Professional Roles" (competencies ranked by MWDS 3, 9, 11, and 13) (Table 1). The fact that four competencies related to "Facilitating Positive Public Image" were highly ranked agrees with earlier research (Garton & Chung 1995). Also, the literature supports providing entry-phase teachers with additional training in the area of "Facilitating Student Leadership and Personal Growth," i.e., the FFA (Birkenholz & Harbstreit, 1987; Garton & Chung, 1995; Shippy, 1981; Talbert, Camp, & Heath-Camp, 1994; Webb et al., 1977).

Of the ten lowest ranking competencies (154-163) based on MWDS, only one, "Planning materials and methods for new scheduling patterns such as block periods" had a corresponding Expressed Needs Rank higher than 114. This competency had a MWDS Rank=154 and an Expressed Needs Rank=8 (Table 1).

In Phase I of this study, Briers and Edwards (1998) found a high expressed need for inservice training in the area "Facilitating Adult Learning Environments." Teachers rated four of the eleven competencies from this area among their top ten inservice needs. By contrast, in Phase II the four competencies "Securing resources to conduct adult and continuing education programs," "Collaborating with other community adult education programs such as TAEX," "Managing an adult education program," and "Using distance education methods to deliver adult education in the community," had MWDS rankings of 95, 101, 106, and 108, respectively (Table 1). Studies by Claycomb and Petty (1983), Birkenholz and Harbstreit (1987), Garton and Chung (1995) all found that "entry-phase" or "beginning" teachers rated adult education low in terms of need for inservice education.

Conclusions/Recommendations/Implications

Waters and Haskell (1989) posited that "gathering data from potential clientele and actively involving them in the process of identifying potential educational programs increases the likelihood of implementing relevant educational programs; thus, increasing the likelihood of achieving appropriate outcomes" (p. 26). Yet, what is the more appropriate method for "gathering" of data? Is a "discrepancy" model approach superior to one of "direct" assessment?

Phase II of this study relied on the MWDS rankings for the competencies under investigation. The competency areas ranked highest in need for inservice education were: "Facilitating Change in Curriculum and Technologies," "Facilitating Balance in Personal and Professional Roles," "Facilitating Positive Public Image," "Facilitating Student Leadership and Personal Growth," "Facilitating Student Learning in Classroom and Laboratory Settings," "Facilitating Student Agricultural Experiences," "Facilitating Student Career Success," "Facilitating Personal Professional Improvement," and "Planning and Managing Learning Environments."

Although in partial agreement with the findings of Phase I (Briers & Edwards, 1998), when teachers "rated" their inservice needs, i.e., expressed needs, the competency areas related to providing adult education, carrying out certain human relations tasks, and planning and managing learning environments revealed greatly varied rankings (Table 1). Other researchers have noted differences in rankings obtained via direct assessment versus those derived from discrepancy scores (Barrick et al., 1983). Newman and Johnson (1994) found that "rankings of the units [from agriculture courses] based on the mean weighted discrepancy scores appeared to be quite different from rankings of the units based solely on importance or competence" (p. 60).

Garton and Chung (1995) asked beginning agriculture teachers in Missouri to "rate" both their "level of importance" and "level of competence" (p. 78) for 50 competencies, and used mean weighted discrepancy scores to rank those needs. Their results were very similar to the findings of this study. Other researchers (Barrick et al., 1983; Barrick & Doerfert, 1989; Barrick & Powell, 1986; Newman & Johnson, 1994) have contrasted the mean weighted discrepancy score rankings of inservice needs with rankings of importance, application, knowledge or competence ratings, and drawn similar conclusions. Waters and Haskell (1989) incorporated the dimension of "opportunity" (p. 26) for using the additional information and concluded that "... rankings of individual topics were substantively different than what would have been obtained using more traditional methods" and further stated, "the additional information appears to add to the validity of the needs assessment process" (p. 31).

Unlike previous research, this study contrasted rankings based on mean weighted discrepancy scores with rankings based on teachers' expressed needs for inservice , i.e., direct assessment (Table 1). That is, the contribution of this study to "theory" may be its comparison of a discrepancy model for identifying inservice needs to a direct assessment approach in which teachers are asked to identify expressly their needs for inservice. Findings from the MWDS portion of this study concerning competency areas in which teachers need inservice are in agreement with those of earlier researchers such as Garton and Chung (1995), Newman and Johnson (1994), Birkenholz and Harbstreit (1987), and Claycomb and Petty (1983). Much of the results from the direct assessment approach are not supported by this previous research. Thus, if the previous research was valid, a discrepancy approach does provide a more valid picture of inservice education needs than does a direct assessment approach in which teachers are asked to rate expressly their need for inservice education.

Based on the findings of this study, the researchers recommend (1) those responsible for delivering inservice training to entry-phase agriculture teachers, prioritize and allocate resources based on mean weighted discrepancy score rankings, and (2) future needs assessment studies be designed so mean weighted discrepancy scores may be calculated and ranked for the purpose of planning and prioritizing the delivery of inservice.

Based on MWDS rankings, agricultural educators in Texas should offer inservice education designed to assist entry-phase agriculture teachers in acquiring competence in the areas of "Facilitating Change in Curriculum and Technologies," "Facilitating Balance

in Personal and Professional Roles," "Facilitating Positive Public Image," and "Facilitating Student Leadership and Personal Growth" (Table 1).

Finally, based on this recommendation, for the summer of 1998, agricultural educators in Texas have planned inservice education in designing computer-assisted instruction (e.g., using the internet as a teaching tool), in implementing new curricula and technologies, in preparing students for participation in leadership and career development events, in managing FFA programs, and in balancing personal and professional roles.

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